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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	**Application No.** 10/520,988	**Applicant(s)** WEESE ET AL.	
	Examiner DAVID P. RASHID	**Art Unit** 2624	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *04 February 2008*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-33* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-33* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *04 February 2008* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.

4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .

5) ☐ Notice of Informal Patent Application

6) ☐ Other: _____.

DETAILED ACTION

[1] All of the examiner's suggestions presented herein below have been assumed for examination purposes, unless otherwise noted.

Amendments

[2] This office action is responsive to the claim and specification Amendment received on February 4, 2008. Claims 1-33 remain pending; claims 19-33 new. The Examiner notes to the Applicant that the Preliminary Amendment filed November 6, 2007 was not addressed in the Non-Final Rejection mailed November 8, 2007 (*i.e.* newly added claims 19-33 were not examined) , and this Non-Final Rejection is hereby in response to both the November 6, 2007 Preliminary Amendment and February 4, 2008 Amendment.

Drawings

[3] The replacement drawings were received on February 4, 2008 and are acceptable. In response to applicant's drawing amendments and remarks, the previous drawing objections are withdrawn.

Specification

[4] In response to applicant's specification amendments and remarks received on February 4, 2008, the previous specification objections are withdrawn.

Claim Objections

[5] In response to applicant's claim objections amendments and remarks received on February 4, 2008, the previous claim objections are withdrawn.

Claim Objections - 37 CFR 1.75(a)

[6] The following is a quotation of 37 CFR 1.75(a):

> The specification must conclude with a claim particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention or discovery.

[7] Claims 21 and 27-28 is objected to under 37 CFR 1.75(a), as failing to conform to particularly point out and distinctly claim the subject matter which application regards as his invention or discovery.

[i] Claim 21 contains acronyms that are not formally in formally introduced (i.e. using the full phrase of the acronym followed by the acronym itself in parentheses)

[ii] Claim 27, l. 2 contains a grammatical error - suggest changing to "motion model ~~mode~~".

[iii] Claim 28, l. 8 contains a grammatical error – suggest changing to “modality sequence ~~sequency~~”

Claim Rejections - 35 USC § 112

[8] The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

[9] Claim 22 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 22, ll. 2-4 cites “[A] includes [B], and [C], or [D]” but it is unclear whether A includes either (B and C) or D; or B and (C or D). The examiner has interpreted (B and C) or D.

[11] The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

[12] Claims 23-24 and 26 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant

art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

[i] Claim 23, l. 3 cites "registering coordinates systems" but nowhere in the original disclosure supports the registration of coordinate systems.

[ii] Claim 24, ll. 2-3 cites "wherein the first and second imaging modality data acquisition systems are <u>mechanically linked</u>" (*emphasis added*) but nowhere in the original disclosure supports a mechanical linkage of the first and second imaging modality data acquisition systems.

[iii] Claim 26, ll. 2 cites "wherein the sensed motion is <u>a cyclic motion</u> in which <u>the object cyclically assumes</u>…"(*emphasis added*) but nowhere in the original disclosure supports the motion being a cyclic motion and that the object cyclically assumes. The original disclosure does support frequency and frequency patterns, but the notion of "cyclic" altogether may imply something entirely different.

Claim Rejections - 35 USC § 102

[10] The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

[11] **Claims 1-5, 7,10-16, 19-20, 22-30,** and **32-33** are rejected under 35 U.S.C. 102(b) as being anticipated by Bani-Hashemi et al. (US 5,690,106 A).

[i] Regarding **claim 1**, Bani-Hashemi discloses a method (fig. 3) comprising:

acquiring first modality image data ("CONTRAST SEQUENCE" in fig. 3) while an imaged object (fig. 1, item 40) moves over a range of motion ("function of x, y, and θ" at 4:39-41; 4:13-25) and reconstructing the first modality image data into a motion artifacted first modality image ("CONTRAST SEQUENCE" image "θ_I" in fig. 3);

acquiring second modality image data ("MASK SEQUENCE" in fig. 3) and reconstructing the second modality image data into second modality images ("MASK SEQUENCE" images "θ_1" through "θ_T" in fig. 3) which represent the object in respective states of motion with as few motion artifacts as possible;

from the second modality images ("MASK SEQUENCE" images "θ_1" through "θ_T" in fig. 3), determining a motion model ("W^n" in fig. 3; fig. 4, element 5) which characterizes states of motion assumed by the object while moving through the states of motion;

forming an intermediate image ("MASK SEQUENCE" image "$\theta_I+\Delta\theta$" in fig. 3) of the object from the motion model ("W^n" in fig. 3; fig. 4, element 5) and the second modality images ("MASK SEQUENCE" images "θ_1" through "θ_T" in fig. 3), the intermediate image representing the object as if it had moved during the acquiring of the second modality image data over the range of motion over which the object moved as the first modality image data was acquired (fig. 4, item 6; "If the mask image was acquired at

angular position θ and the corresponding contrast image was taken at position $\theta+\delta\theta$. To get a perfect subtraction, we would need the mask image at position $\theta+\delta\theta$.", at 4:30-33);

forming a combination image (5:15-20; "subtraction data" at 3:53-59) from the intermediate image ("MASK SEQUENCE" image "$\theta_I+\Delta\theta$" in fig. 3) and the first modality image ("CONTRAST SEQUENCE" in fig. 3).

[ii] Regarding **claim 2**, Bani-Hashemi discloses a method (fig. 3) of enhancing a first image ("CONTRAST SEQUENCE" image "θ_I" in fig. 3) of a moving object (fig. 1, item 40), the first image containing motion artifacts, the method including:

acquiring further images ("CONTRAST SEQUENCE" images "θ_1" through "θ_T" in fig. 3) that represent the object in a respective state of motion with as few motion artifacts as possible;

from the further images, determining a motion model ("W^n" in fig. 3; fig. 4, element 5) that characterizes the states of motion assumed by the object;

focusing (the subtraction step between the geometrically corrected mask data and contrast data is "focusing" on the contrast data) the first image ("CONTRAST SEQUENCE" image "θ_I" in fig. 3) by means of the motion model ("W^n" in fig. 3; fig. 4, element 5).

[iii] Regarding **claim 3**, Bani-Hashemi discloses a method (fig. 3) of enhancing information contents (5:15-20; "subtraction data" at 3:53-59 leads to enhancement) of a first image ("CONTRAST SEQUENCE" image "θ_I" in fig. 3) of a moving object (fig. 1, item 40), to be reconstructed from projections acquired as the object moves over a plurality

of states of motion ("function of x, y, and θ" at 4:39-41; 4:13-25) and containing motion artifacts, which method includes:

acquiring two further images ("MASK SEQUENCE" images "θ_1" through "θ_T" in fig. 3) that represent the object in at least two of the states of motion with as few motion artifacts as possible;

from the further images ("MASK SEQUENCE" images "θ_1" through "θ_T" in fig. 3), determining a motion model ("W^n" in fig. 3; fig. 4, element 5) that characterizes the states of motion assumed by the object while the projections are acquired;

forming at least one intermediate image ("MASK SEQUENCE" image "$\theta_I+\Delta\theta$" in fig. 3) of the object (fig. 1, item 40) from the motion model ("W^n" in fig. 3; fig. 4, element 5) and the two further images ("MASK SEQUENCE" images "θ_1" through "θ_T" in fig. 3), the at least one intermediate image representing one ore more of the states of motion assumed by the object while the projections are acquired;

reconstructing (5:15-20; "subtraction data" at 3:53-59) the first image ("CONTRAST SEQUENCE" image "θ_I" in fig. 3) from the projections of the object and the at least one intermediate image ("MASK SEQUENCE" image "$\theta_I+\Delta\theta$" in fig. 3).

[iv] Regarding **claim 4**, Bani-Hashemi discloses the method as claimed in claim 1, wherein determining the motion model ("W^n" in fig. 3; fig. 4, element 5) includes:

determining a respective motion vector field (8:33-34) for parts of the object (fig. 1, item 40).

[v] Regarding **claim 5**, Bani-Hashemi discloses wherein forming the intermediate image ("MASK SEQUENCE" image "$\theta_I+\Delta\theta$" in fig. 3) includes:

forming other images ("MASK SEQUENCE" image "$\theta_I+\Delta\theta$" in fig. 3 is repeated for every "CONTRAST SEQUENCE" image "θ_I") of other states of motion of the object from the second modality image data ("MASK SEQUENCE" in fig. 3);

weighting (equal weight) and subsequently superimposing (5:15-20; "subtraction data" at 3:53-59) the other images ("MASK SEQUENCE" image "$\theta_I+\Delta\theta$" in fig. 3 is repeated for every "CONTRAST SEQUENCE" image "θ_I") and the second modality images ("MASK SEQUENCE" in fig. 3) in conformity with a frequency (the frequency being a fixed "θ"; *see also* 10:41-61 in regard to "breathing" creating a frequency of the rib cage) at which each of the other states of motion were assumed by the object while moving over the range of motion ("function of x, y, and θ" at 4:39-41; 4:13-25) while the first modality image data ("CONTRAST SEQUENCE" in fig. 3) was acquired.

[vi] Regarding **claim 7**, Bani-Hashemi discloses the method as claimed in claim 1, further including:

focusing the combination image (the subtraction step between the geometrically corrected mask data and contrast data is "focusing" on the contrast data).

[vii] Regarding **claim 10**, Bani-Hashemi discloses an image processing system (fig. 1) which includes a data processing unit (fig. 1, item 14) for carrying out the method as claimed in claim 1 (refer to references/arguments as cited in claim 1).

[viii] Regarding **claim 11**, Bani-Hashemi discloses a medical examination apparatus (fig. 1), the apparatus including:

a device for forming images or projections by means of a first imaging method (the method used to obtain the contrast stack in fig. 2);

a second device for forming images or projections by means of a second imaging method (the method used to obtain the mask stack in fig. 2);

an image processing system that includes a data processing unit (fig. 1, item 14) for carrying out the method as claimed in claim 1 (refer to references/arguments as cited in claim 1).

[ix] Regarding **claim 12**, Bani-Hashemi discloses a computer readable medium containing instructions for controlling a data processing unit (fig. 1, item 14) in such a manner that the data processing unit can carry out (it is suggested that the data processing unit 14 "can" carry out the method as it is inherent that the processor must contain instruction for doing so) the method as claimed in claim 1 (refer to references/arguments as cited in claim 1).

[x] Regarding **claim 13**, claim 4 recites identical features as in claim 13. Thus, references/arguments equivalent to those presented for claim 4 are equally applicable to claim 13.

[xi] Regarding **claim 14**, claim 4 recites identical features as in claim 14. Thus, references/arguments equivalent to those presented for claim 4 are equally applicable to claim 14.

[xii] Regarding **claim 15**, claim 5 recites identical features as in claim 15. Thus, references/arguments equivalent to those presented for claim 5 are equally applicable to claim 15.

[xiii] Regarding **claim 16**, claim 5 recites identical features as in claim 16. Thus, references/arguments equivalent to those presented for claim 5 are equally applicable to claim 16.

[xiv] Regarding **claim 19**, Bani-Hashemi discloses a method of motion compensation comprising:

acquiring a first sequence of image data ("CONTRAST SEQUENCE" in fig. 3) of a moving object (fig.1, item 40) by a first imaging modality data acquisition system (fig. 1);

acquiring a second sequence of image data ("MASK SEQUENCE" in fig. 3) of the moving object by a second imaging modality data acquisition system (fig. 1 at a later time; 4:13-25);

determining a motion model ("W^n" in fig. 3; fig. 4, element 5) related to periodic motion (10:41-61 in regard to "breathing" creating a frequency of the rib cage, it being "related" to the calculated motion model that is based on the mask sequence) of the object based on the second sequence of image data;

using the determined motion model, generating from the first sequence of image data ("CONTRAST SEQUENCE" in fig. 3) a first modality image data set ("CONTRAST SEQUENCE" image "θ_I" in fig. 3) in a selected motion state.

[xv] Regarding **claim 20**, Bani-Hashemi discloses the method as claimed in claim 19, further including:

generating a combined image data set (5:15-20; "subtraction data" at 3:53-59) in the selected motion state from the first modality image data set ("CONTRAST SEQUENCE" image "θ_I" in fig. 3) and a second modality image data set ("MASK SEQUENCE" image "$\theta_I+\Delta\theta$" in fig. 3) in the selected motion state.

[xvi] Regarding **claim 22**, Bani-Hashemi discloses the method as claimed in claim 19, wherein the second imaging modality data acquisition system includes a computer

tomography (CT) system, and ultrasound system, or a fast magnetic resonance (MR) tomography system (*refer to 112 rejection*; "magnetic resonance" in 11:14).

[xvii] Regarding **claim 23**, Bani-Hashemi discloses the method as claimed in claim 19, further including:

registering coordinates systems ("coordinates" at 6:19-25; "function of x, y, and θ" at 4:39-41; 4:13-25) of the first and second imaging modality data acquisition systems.

[xviii] Regarding **claim 24**, Bani-Hashemi discloses the method as claimed in claim 19, wherein the first and second imaging modality data acquisition systems (fig. 1) are mechanically linked (they are linked in that they are both the same data acquisition systems at different times (*i.e.* before and after contrast)).

[xix] Regarding **claim 25**, Bani-Hashemi discloses the method as claimed in claim 19, further including:

sensing motion (the purpose of the invention itself is to find motion function "W^n" using "x, y, and θ" that involves the first and second sequence of imaging data (*i.e.* fig. 3)) of the object (fig. 1, item 40) at least during acquisition of the second sequence of imaging data.

[xx] Regarding **claim 26**, Bani-Hashemi discloses the method as claimed in claim 25, wherein the sensed motion is a cyclic motion in which the object (fig. 1, item 40) cyclically assumed each of a plurality of motion states (10:41-61 in regard to "breathing" creating a frequency of the rib cage, it being "related" to the calculated motion model that is based on the mask sequence).

[xxi] Regarding **claim 27**, Bani-Hashemi discloses the method as claimed in claim 19, wherein the motion model ~~mode~~ ("W^n" in fig. 3; fig. 4, element 5) includes a motion vector

field (vectors includes in equations [1], [2], and [3] on col. 5) which indicates movement between at least two motion states.

[xxii] Regarding **claim 28**, Bani-Hashemi discloses an imaging system comprising:

a first imaging modality data acquisition system (fig. 1) for generating a first imaging modality sequence of image data ("CONTRAST SEQUENCE" fig. 3);

a second imaging modality data acquisition system (fig. 1) for generating a second imaging modality sequence of image data ("MASK SEQUENCE" fig. 3);

a motion sensor for sensing object motion (fig. 1, item 14; fig. 3);

a processor (fig. 1, item 14; fig. 3) for determining a motion model ("W^n" in fig. 3; fig. 4, element 5) from the sensed motion and the second modality sequency ~~sequency~~ of image data.

[xxiii] Regarding **claim 29**, Bani-Hashemi discloses the imaging system as claimed in claim 28, wherein the motion model ("W^n" in fig. 3; fig. 4, element 5) characterizes motion states (motion states "θ_I" in fig. 3 are assumed) assumed by the object while moving among a plurality of motion states.

[xxiv] Regarding **claim 30**, Bani-Hashemi discloses the imaging system as claimed in claim 28, further including:

operating mathematically with the motion model to transform the first imaging modality image data to a selected motion state ("MASK SEQUENCE" image "$\theta_I+\Delta\theta$" in fig. 3 is repeated for every "CONTRAST SEQUENCE" image "θ_I").

[xxv] Regarding **claim 32**, Bani-Hashemi discloses a method for motion corrected imaging comprising:

generating image data using a first imaging modality ("MASK SEQUENCE" in fig. 3);

generating a plurality of images using a second imaging modality ("CONTRAST SEQUENCE" in fig. 3);

from the second imaging modality images and sensed motion of an imaged object, generating a motion model ("W^n" in fig. 3; fig. 4, element 5);

operating on the first modality image data ("MASK SEQUENCE" in fig. 3) with the motion model to create a first modality image ("MASK SEQUENCE" image "$\theta_I+\Delta\theta$" in fig. 3) in a selected motion state ("$\theta_I+\Delta\theta$" in fig. 3).

[xxvi] Regarding **claim 33**, Bani-Hashemi discloses the method as claimed in claim 32, further including:

combining the first modality image ("MASK SEQUENCE" image "$\theta_I+\Delta\theta$" in fig. 3) in the selected motion state ("$\theta_I+\Delta\theta$" in fig. 3) with a second modality image ("CONTRAST SEQUENCE" image "θ_I" is associated with "MASK SEQUENCE" image "$\theta_I+\Delta\theta$") in the selected motion state ("$\theta_I+\Delta\theta$" in fig. 3).

Claim Rejections - 35 USC § 103

[12] The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

[13] **Claims 6** and **8** are rejected under 35 U.S.C. 103(a) as being unpatentable over Bani-Hashemi et al. (US 5,690,106 A) in view of Tom et al. (Motion Estimation of Skeletonized

Angiographic Images Using Elastic Registration, IEEE Transactions on Medical Imaging, Vol. 13, No. 3, 11/1994, pp 450 – 460).

[i] Regarding **claim 6**, while Bani-Hashemi discloses the method as claimed in claim 1, Bani-Hashemi does not teach further including: elastically registering the intermediate image and the first modality image are elastically registered, prior to the formation of the combination image.

Tom teaches elastically registering an image wherein images are elastically registered (abstract; introduction, p. 450), prior to the formation of the completed image.

It would have been obvious to one of ordinary skill in the art at the time the invention was made for the intermediate image and first modality image of Bani-Hashemi to be elastically registered as taught by Tom AND for the combination image of Bani-Hashemi to be the completed image as taught by Tom "in order to estimate the motion of the corresponding arteries", Tom, Abstract and that it "is very successful especially with low contrast and noisy angiographic images", Tom, Abstract.

[ii] Regarding **claim 8**, claims 1 and 6 recite identical features as in claim 8. Thus, references/arguments equivalent to those presented above for claims 1 and 6 are equally applicable to claim 8.

[14] **Claims 9, 17 – 18, 21** and **31** are rejected under 35 U.S.C. 103(a) as being unpatentable over Bani-Hashemi et al. (US 5,690,106 A) in view of Levin (US 5,546,472 A).

[i] Regarding **claim 9**, while Bani-Hashemi discloses the method as claimed in claim 1, wherein the first modality image is one of a CT image (4:66-5:4 suggests CT use) and the second modality images are one of CT images (4:66-5:4 suggests CT use) and MR

images, Bani-Hashemi does not teach wherein the first image is a PET image or a SPECT image.

Levis discloses a feature guided method for obtaining an image of an object (fig. 1a) that teaches wherein the imaging system may be a CT, PET, SPECT, or other imager (17:6-11).

It would have been obvious to one of ordinary skill in the art at the time the invention was made for the first modality image of Bani-Hashemi to be selected from CT, PET, SPECT, or other imager as taught as by Levin AND for the second modality images of Bani-Hashemi to also be selected from CT, PET, SPECT, or other imager as taught as by Levin "to provide a method and apparatus which employs feature recognition imaging which determines how to scan and reconstruct images of other similar subjects without incorrect guesswork or free parameters.", Levin, 2:66-3:3.

[ii] Regarding **claim 17**, claim 9 recites identical features as in claim 17. Thus, references/arguments equivalent to those presented above for claim 9 are equally applicable to claim 17.

[iii] Regarding **claim 18**, claim 9 recites identical features as in claim 18. Thus, references/arguments equivalent to those presented above for claim 9 are equally applicable to claim 18.

[iv] Regarding **claim 21**, claim 9 recites identical features as in claim 21. Thus, references/arguments equivalent to those presented above for claim 9 are equally applicable to claim 21.

[v] Regarding **claim 31**, claim 9 recites identical features as in claim 31. Thus, references/arguments equivalent to those presented above for claim 9 are equally applicable to claim 31.

Response to Arguments

[15] Applicant's arguments filed on February 4, 2008 with respect to **claims 1-2** have been respectfully and fully considered, but they are not found persuasive.

[16] Summary of Remarks regarding **claim 1** (Applicant Resp. at 16-17, February 4, 2008):

[i] Applicant argues that the cited reference acquires images from a *stationary object.* Since the object is not moving in the cited reference, a motion model is not created by Bani-Hashemi and no state of motion is characterized; therefore, the cited reference fails to disclose or suggest *determining a motion model which characterizes states of motion assumed by the object* as recited by independent claim 1.

[ii] Furthermore, Bani-Hashemi fails to disclose or suggest forming an intermediate image of the object from the motion model and the second modality images, the intermediate image representing the object as if it had moved over the range of motion over which the object moved as the first modality data was acquired, as independent claim 1 recites. Examiner contends that the cited reference discloses this claimed feature by computing geometrically corrected mask data that is derived from interpolation.

[iii] The cited reference does not form an intermediate image of the object from a motion model and the further images. Instead, the cited reference appears to disclose forming a set of images from the two existing sets of images, and does not employ a motion model or any equivalent in conjunction with the two sets of images. Thus, Bani-

Hashemi does not disclose or suggest forming an intermediate image of the object from the motion model and the second modality images.

[17] Examiner's Response regarding **claim 1**:

[i] However, the object is moving in two various ways. First, the object (Bani-Hashemi, fig. 1, item 40) in 10:41-61 moves with regard to "breathing" creating a frequency of the rib cage, it being "related" to the calculated motion model that is based on the mask sequence. Second, the object moves with regard to item 10 in fig. 1. Item 10 rotates, thus object item 40 moves with respect to item 10 that is in a standstill position within itself (according to the principles of relativity).

[ii] However, Bani-Hashemi does disclose and suggest forming an intermediate image ("MASK SEQUENCE" image "$\theta_I+\Delta\theta$" in fig. 3) of the object from the motion model (fig. 4, item 5) and the second modality images ("MASK SEQUENCE" in fig. 3), the intermediate image representing the object as if it had moved over the range of motion over which the object moved as the first modality data was acquired ("$\theta_I+\Delta\theta$" is a rotation between "θ_I" and "θ_T" (*i.e.* the range) for which "θ_I" in the "CONTRAST SEQUENCE" is being paired with), as independent claim 1 recites.

[iii] However, Bani-Hashemi does form an intermediate image("MASK SEQUENCE" image "$\theta_I+\Delta\theta$" in fig. 3) of the object from a motion model and the further images.

[18] Summary of Remarks regarding **claim 2** (Resp. at 17-18):

[i] Applicant argues that t*he cited reference, as noted supra,* does not disclose or suggest any such moving object. Therefore, no motion model can be computed by the cited reference. Furthermore, the cited reference fails to disclose that W^n is derived from the contrast and mask sequences, or that W^n characterizes states of motion. Therefore, Bani-

Hashemi *et at.* fails to disclose or suggest *determining a motion model which characterizes states of motion assumed by the object.*

[19] Examiner's Response regarding **claim 2**:

[i] However, the object is moving in two various ways. First, the object (Bani-Hashemi, fig. 1, item 40) in 10:41-61 moves with regard to "breathing" creating a frequency of the rib cage, it being "related" to the calculated motion model that is based on the mask sequence. Second, the object moves with regard to item 10 in fig. 1. Item 10 rotates, thus object item 40 moves with respect to item 10 that is in a standstill position within itself (according to the principles of relativity).

Conclusion

[20] The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. US 5361763 A; US 5560360 A; US 5768413 A; US 5839440 A; US 5850486 A; US 5910728 A; US 6075836 A; US 6088611 A; US 6178271 B1; US 6229570 B1; US 6298110 B1; US 20010031920 A1; US 6341179 B1.

[21] Any inquiry concerning this communication or earlier communications from the examiner should be directed to David P. Rashid whose telephone number is (571) 270-1578. The examiner can normally be reached Monday - Friday 8:30 - 17:00 ET.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Vikkram Bali can be reached on (571) 272-7415. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished

applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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Examiner, Art Unit 2624

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